Claims

What is claimed is:

1. A method of profiling an optical beam comprising:

positioning a programmable spatial light modulator in an incident optical beam;

sequentially moving the spatial light modulator to at least one position in a first planar direction in a displacement increment less than a pixel width of the spatial light modulator; and

directing respective portions of the optical beam to a photodetector at each position of the spatial light modulator.

2. The method of claim 1, further comprising detecting a respective power of each portion of the incident optical beam directed to the photodetector at each position of the spatial light modulator.

3. The method of claim 2, further comprising

correlating the respective pixels of the spatial light modulator at each position with the respective detected power of each portion of the incident optical beam; and

processing correlated detected powers to determine an optical beam profile of the incident optical beam.

4. The method of claim 1, further comprising moving the spatial light modulator in sequential increments to traverse a distance corresponding to the pixel width of the spatial light modulator.

5. The method of claim 1, further comprising sequentially moving the spatial light modulator to positions in a second planar direction orthogonal to the first planar direction in displacement increments less than a pixel width of the spatial light modulator.

6. The method of claim 1, further comprising simulating a knife edge, a moving slit, a pin hole, or a variable aperture passing through a cross section of the incident optical beam at each position.

7. The method of claim 6, further comprising:

commanding a respective linear set of pixels of a spatial light modulator to direct respective portions of an incident optical beam to a photodetector;

sequentially commanding each pixel of the linear set to direct respective pixel portions of the incident optical beam away from the photodetector; and

detecting a respective power of each portion of incident optical beam directed to the photodetector.

8. The method of claim 7, further comprising selecting the linear set of pixels so that a total optical power directed to the photodetector is within a desired operating range of the photodetector.

9. The method of claim 7, further comprising:

correlating the respective pixels of the spatial light modulator with a respective detected power of each portion of the incident optical beam; and

processing correlated detected powers to determine an optical beam profile of the incident optical beam.

10. An optical beam profiler comprising:

a programmable spatial light modulator for selectively directing light from an incident optical beam;

a translation stage for moving the spatial light modulator in relation to the incident optical beam; and

a photodetector for detecting a power of light directed by the spatial light modulator.

11. A method of profiling an optical beam comprising:

commanding a respective linear set of pixels of a spatial light modulator to direct respective portions of an incident optical beam to a photodetector;

sequentially commanding each pixel of the linear set to direct respective pixel portions of the incident optical beam away from the photodetector; and

detecting a respective power of each portion of incident optical beam directed to the photodetector.

12. The method of claim 11, further comprising selecting the linear set of pixels so that a total optical power directed to the photodetector is within a desired operating range of the photodetector.

13. The method of claim 11, further comprising:

correlating the respective pixels of the spatial light modulator with a respective detected power of each portion of the incident optical beam; and

processing correlated detected powers to determine an optical beam profile of the incident optical beam.

14. The method of claim 11, further comprising sequentially commanding respective linear sets of pixels of the spatial light modulator to direct respective portions to a photodetector in a first planar direction.

15. The method of claim 14, further comprising sequentially commanding respective linear sets of pixels of the spatial light modulator to direct respective portions to a photodetector in a second planar direction orthogonal to the first planar direction.

16. The method of claim 11, further comprising:

sequentially moving the spatial light modulator to at least one position in a planar direction in a displacement increment less than a pixel width of the spatial light modulator; and

detecting a respective power of each portion of the incident optical beam directed to the photodetector at each position.

17. The method of claim 16, further comprising moving the spatial light modulator in sequential increments to traverse a distance corresponding to the pixel width of the spatial light modulator.

18. A method of profiling an optical beam comprising:

positioning a programmable spatial light modulator in an incident optical beam;

sequentially commanding respective sets of pixels in the spatial light modulator to direct respective portions of the optical beam to a photodetector; and

commanding, for each set, at least the pixels in the spatial light modulator illuminated by the optical beam, to direct the optical beam to the photodetector.

19. The method of claim 18, further comprising, for each set:

detecting a first power corresponding to a respective portion of the optical beam directed to the photodetector; and

detecting a second power corresponding to the optical beam directed to the photodetector.

20. The method of claim 19, further comprising, for each set, dividing the first power by the second power to calculate a normalized power.

21. The method of claim 20, further comprising:

correlating respective sets of pixels of the spatial light modulator with a respective normalized power corresponding to a respective portion of the optical beam directed to the photodetector; and

processing correlated normalized powers to determine an optical beam profile of the incident optical beam.

22. A method of profiling an optical beam comprising:

positioning a programmable spatial light modulator in an incident optical beam;

sequentially commanding respective sets of pixels in the spatial light modulator to direct respective portions of the optical beam to a first photodetector; and

simultaneously commanding respective remainders of the pixels, not included in each respective set, to direct respective complementary portions of the optical beam to a second photodetector.

23. The method of claim 22, further comprising, for each set:

detecting a first power corresponding to the respective portion of the optical beam directed to the first photodetector; and

detecting a second power corresponding to the respective complementary portion of the optical beam directed to the second photodetector.

24. The method of claim 23, further comprising, for each set:

adding the first and second powers to calculate a total power;

and dividing the first power by the total power to calculate a normalized power.

25. The method of claim 24, further comprising:

correlating respective sets of pixels of the spatial light modulator with a respective normalized power corresponding to a respective portion of the optical beam directed to the photodetector; and

processing correlated normalized powers to determine an optical beam profile of the incident optical beam.

26. A method of calibrating at least two optical detectors comprising:

positioning a programmable spatial light modulator in an incident optical beam

sequentially commanding respective sets of pixels in the spatial light modulator to direct respective portions of the optical beam to a first photodetector; and

sequentially commanding the respective sets of pixels in the spatial light modulator to direct respective portions of the optical beam to a second photodetector

27. The method of claim 26, further comprising, for each set:

detecting a first power corresponding to the respective portion of the optical beam directed to the first photodetector; and

detecting a second power corresponding to the respective portion of the optical beam directed to the second photodetector.

28. The method of claim 27, further comprising, for each set, dividing the first power by the second power to calculate a normalized power.

29. The method of claim 28, further comprising:

correlating respective sets of pixels of the spatial light modulator with a respective normalized power corresponding to a respective portion of the optical beam directed to the first photodetector; and

processing correlated normalized powers to determine an optical beam profile of the incident optical beam.